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Facsimile: **719-783-0990**
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

OFFICIAL

In re the Application of: **Dabak et al.**　　　　Docket Number: **TI-29347**

Serial No.: **09/595,561**　　　　Art Unit: **2634**

Filed: **08/16/2000**　　　　Examiner: **E.M. Chang**

For: **WIRELESS COMMUNICATIONS SYSTEM WITH SECONDARY SYNCHRONIZATION CODE BASED ON VALUES IN PRIMARY SYNCHRONIZATION CODE**

CERTIFICATION OF FACSIMILE TRANSMISSION

I hereby certify that the following papers are being transmitted by facsimile to the U.S. Patent and Trademark Office at (703) 872-9306 on the date shown below:

Robert N. Rountree, Reg. No. 39,347

April 12, 2004
Date

FACSIMILE COVER SHEET

X FACSIMILE COVER SHEET	**X** AMENDMENT ___(19 Pages)
___ NEW APPLICATION	**X** EOT ___(1 Page)
X DECLARATION/ATTACHMENTS (8 Pages)	___ NOTICE OF APPEAL (# Pages)
___ ASSIGNMENT (# Pages)	___ APPEAL ___(# Pages)
___ FORMAL DRAWINGS	___ FEE TRANSMITTAL (# Page)
___ INFORMAL DRAWINGS	___ REPLY BRIEF (IN TRIPLICATE) (# Pages)
___ CONTINUATION APP'N (# Pages)	___
___ DIVISIONAL APP'N	

NAME OF INVENTOR(S):	RECEIPT DATE & SERIAL NO.: **09/595,561**
Dabak et al..	FILING DATE: **June 16, 2000**
TITLE OF INVENTION: **WIRELESS COMMUNICATIONS SYSTEM WITH SECONDARY SYNCHRONIZATION CODE BASED ON VALUES IN PRIMARY SYNCHRONIZATION CODE**	
TI FILE NO.: **TI-29347** ┃ DEPOSIT ACCT. NO.: **20-0668**	
DATE FAXED: **April 12, 2004** DUE: **February 19, 2004** ATTY/SEC'Y: **Robert N. Rountree**	

Robert N. Rountree, LLC
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OFFICIAL

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	Docket No.:	TI-29347
Anand G. Dabak et al.	Examiner:	**Chang, Edith M.**
Serial No.: **09/595,561**	Art Unit:	**2634**
Filed: **06/16/2000**	Confirm No.:	**1123**

For: **WIRELESS COMMUNICATIONS SYSTEM WITH SECOND SYNCHRONIZATION CODE BASED ON VALUES IN PRIMARY SYNCHRONIZATION CODE**

DECLARATION OF ANAND G. DABAK

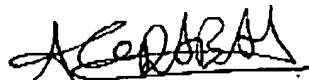I, Anand G. Dabak, do hereby declare:

1.   I am an inventor of the above-identified application which has been assigned to Texas Instruments Incorporated.

2.   I am an author of the paper identified by the Examiner as "TSG_RAN WG1 meeting #5 XP-002244434" cited by the Examiner as a prior art reference in the Office Action dated November 19, 2003.

3.   On May 26, 1999, I e-mailed a copy of the paper titled, "Secondary synchronization codes (SSC) corresponding to the Generalised Hierarchical Golay (GHG) PSC" (ATTACHMENT-1), authored by myself and co-inventors Srinath Hosur and Sundararajan Sriram, to 3GPP TSG RAN WG1, as confirmed by the attached document (ATTACHMENT-2)

4.   I respectfully submit that the Examiner has erred in citing as a prior art reference the paper titled "Secondary synchronization codes (SSC) corresponding to the Generalised Hierarchical Golay (GHG) PSC", because the paper is in fact my own work (and that of co-inventors Srinath Hosur and Sundararajan Sriram) and not that of another.

5.   I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Anand G. Dabak

Date April 8th, 2004

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE   APR 1 2 2004

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In re Application of .	Docket No.: TI-29347
Anand G. Dabak et al.	Examiner: Chang, Edith M.
Serial No.: **09/595,561**	Art Unit: 2634
Filed: **06/16/2000**	Confirm No.: 1123

For: **WIRELESS COMMUNICATIONS SYSTEM WITH SECOND SYNCHRONIZATION CODE BASED ON VALUES IN PRIMARY SYNCHRONIZATION CODE**

DECLARATION OF SRINATH HOSUR

I, Srinath Hosur, do hereby declare:

1.   I am an inventor of the above-identified application which has been assigned to Texas Instruments Incorporated.

2.   I am an author of the paper identified by the Examiner as "TSG_RAN WG1 meeting #5 XP-002244434" cited by the Examiner as a prior art reference in the Office Action dated November 19, 2003.

3.   On May 26, 1999, Anand G. Dabak e-mailed a copy of the paper titled, "Secondary synchronization codes (SSC) corresponding to the Generalised Hierarchical Golay (GHG) PSC" (ATTACHMENT-1), authored by myself and co-inventors Anand G. Dabak and Sundararajan Sriram, to 3GPP TSG RAN WG1, as confirmed by the attached document (ATTACHMENT-2)

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5.   I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

H. Srinath
_____
Srinath Hosur

08 April, 2004
_____
Date

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	Docket No.:	TI-29347 **OFFICIAL**
Anand G. Dabak et al.	Examiner:	Chang, Edith M.
Serial No.: 09/595,561	Art Unit:	2634
Filed: 06/16/2000	Confirm No.:	1123

For: **WIRELESS COMMUNICATIONS SYSTEM WITH SECOND SYNCHRONIZATION CODE BASED ON VALUES IN PRIMARY SYNCHRONIZATION CODE**

DECLARATION OF SUNDARARAJAN SRIRAM
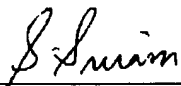
I, Sundararajan Sriram, do hereby declare:

1.   I am an inventor of the above-identified application which has been assigned to Texas Instruments Incorporated.

2.   I am an author of the paper identified by the Examiner as "TSG_RAN WG1 meeting #5 XP-002244434" cited by the Examiner as a prior art reference in the Office Action dated November 19, 2003.

3.   On May 26, 1999, Anand G. Dabak e-mailed a copy of the paper titled, "Secondary synchronization codes (SSC) corresponding to the Generalised Hierarchical Golay (GHG) PSC" (ATTACHMENT-1), authored by myself and co-inventors Anand G. Dabak and Srinath Hosur, to 3GPP TSG RAN WG1, as confirmed by the attached document (ATTACHMENT-2)

4.   I respectfully submit that the Examiner has erred in citing as a prior art reference the paper titled "Secondary synchronization codes (SSC) corresponding to the Generalised Hierarchical Golay (GHG) PSC", because the paper is in fact my own work (and that of co-inventors Anand Dabak and Srinath Hosur) and not that of another.

5.   I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

_____
Sundararajan Sriram

8 April, 2004
Date

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Date: Wed, 26 May 1999 10:09:33 -0500
Reply-To: "Anand G. Dabak" <dabak@HC.TI.COM>
Sender: "3GPP_TSG_RAN_WG1: TSG RAN Working Group 1"
                   <3GPP_TSG_RAN_WG1@LIST.ETSI.FR>
From: "Anand G. Dabak" <dabak@HC.TI.COM>
Organization: DSPS R&D Center, Texas Instruments
Subject: Adhoc 12: Tdoc 574/99
Comments: To: Marlene Forina <Marlene.Forina@etsi.fr>
Content-Type: multipart/mixed;

Hello 3Gpp members,
Attached please find T.I. contribution for Adhoc 12:

Tdoc 574/99: Secondary synchronization codes (SSC) corresponding to
the Generalised Hierarchical Golay (GHG) PSC.

Thanks
Anand Dabak

tdoc 574 99.doc [application/msword]

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ATTACHMENT 1

Secondary synchronisation codes (SSC) corresponding to the Generalised Hierarchical Golay (GHG) PSC

Texas Instruments, May 25[th]1999

Summary:

In [1] Siemens and Texas instruments have jointly proposed the Generalized Hierarchical Golay (GHG) sequence based upon the pruning of the Golay sequence. In this contribution, we propose the secondary synchronization codes (SSC's) corresponding to the GHG PSC that have good a-periodic cross-correlation properties with the GHG PSC and slightly reduced complexity. The basic comma free code and the Hadamard structure of the SSC's is maintained. The proposed SSC's allow for a better sharing of the hardware between the PSC and SSC while improving the aperiodic cross correlation with the PSC.

1.0 Current SSC

The T.I., Siemens jointly proposed GHG PSC is shown in figure (1):

Figure (1): The GHG PSC [1] is shown. The matrix D is given by D = [128, 64, 16, 32, 8, 1, 4, 2] and W = [1, -1, 1, 1, 1, 1, 1, 1].

A block diagram of the current SSC structure corresponding to the GHG [1] is shown in figure (2) below.

Figure (1): The current SSC structure corresponding to the GHG PSC [1] is shown.

However, we find that the aperiodic cross correlation of the SSC to the PSC for the above codes is not very good. We give the maximum aperiodic side lobes (MAS) of the (PSC+SSC) correlation for the 17 codes given above in table (1) below:

ATTACHMENT 2

1

TSG-RAN WG1 meeting #5
Cheju Korea, 1-4, June 1999

TSGR1#5(99)574

SSC code number	Main peak at frequency error (kHz)		MAS of (GHG PSC + SSC) to GHG PSC, at frequency error (kHz)	
	0 kHz	10 kHz	0 kHz	10 kHz
1	256	120	192	78
2	256	121	160	120
3	256	121	88	84
4	256	124	96	123
5	256	122	78	69
6	256	124	160	123
7	256	120	86	75
8	256	136	128	123
9	256	124	88	73
10	256	132	96	113
11	256	120	76	91
12	256	136	192	122
13	256	120	104	70
14	256	121	192	121
15	256	120	142	61
16	256	217	128	65
17	256	131	70	95

Table 1: MAS of the (GHG PSC + SSC) to the GHG PSC is shown for frequency error = 0, 10 kHz.

We can see from table (1) that the MAS of the PSC+SSC to PSC is quite large. But we have found that this does not have significant degradation in the acquisition performance, largely because of the averaging over the comma free codes. However, it will be better if we have the SSC codes more orthogonal to the PSC implying reduced (PSC+SSC) MAS, without increasing the acquisition complexity. We propose that using Golay based SSC will satisfy the above constraints. Letting A = {+1,+1,+1,+1,+1,+1,-1,-1} and B = {+1,-1,+1,-1,+1,-1,-1,+1} we can see that the GHG PSC is given by {A, B, A, B, A, B, -A, -B, -A, -B, A, B, -A, -B, -A, -B, A, B, A, B, A, B, -A, -B, A, B, -A, -B, A, B, A, B}.

By the property of the Golay codes, the PSC correlator in figure (1) can also be implemented as shown in figure (3).

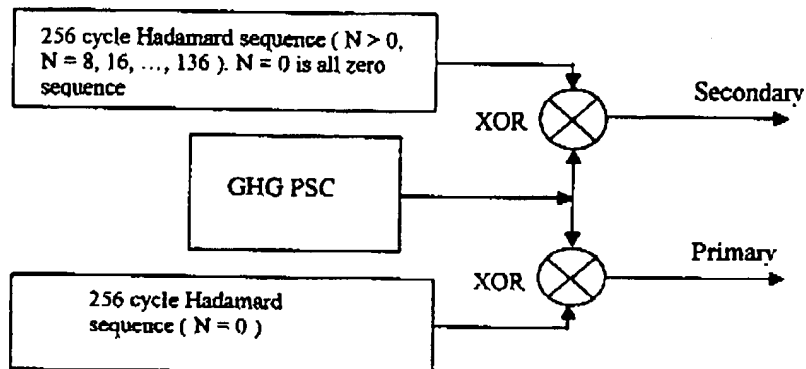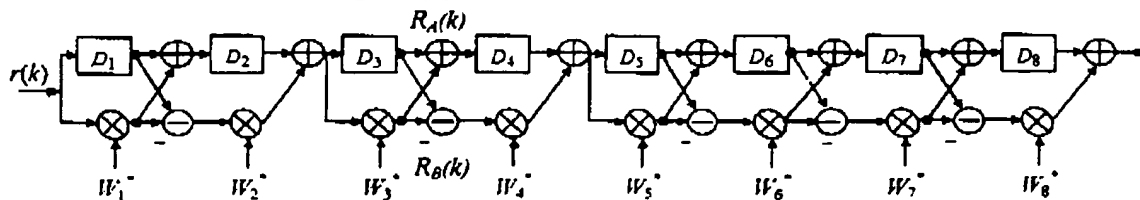*Figure (3): An alternative implementation for the GHG PSC [1] is shown. The matrix D is given by D = [2, 4, 1, 8, 32, 16, 64, 128] and W = [1, 1, 1, 1, 1, 1, -1, 1] and it corresponds to the Hierarchical implementation given in [1].*

2

TSG-RAN WG1 meeting #5
Cheju Korea, 1-4, June 1999

TSGR1#5(99)574

2.0 Proposed SSC sequences

Let the sequence

$Z = \{A, A, A, A, A, A, A, A, A, A, A, A, A, A, A, A, A, A, A, A, A, A, A, A, A, A, A, A, A, A, A, A\}$

$$\text{——————————————————————(1)}$$

Then our proposed SSC structure is shown in figure (4) below:

Figure 4: The proposed SSC sequences derived from the Golay sequence A are given.
The MAS of the (GHG PSC + proposed SSC) with the GHG PSC is shown in table (2)
below:

SSC code number	Main peak, at frequency error (kHz)		MAS of (GHG PSC + proposed SSC) to GHG PSC, at frequency error (kHz)	
	0 kHz	10 kHz	0 kHz	10 kHz
1	256	120	80	63
2	256	120	78	63
3	256	120	80	63
4	256	120	66	63
5	256	120	82	63
6	256	120	78	63
7	256	120	80	63
8	256	120	70	63
9	256	120	80	63
10	256	120	74	63
11	256	120	80	63
12	256	120	70	63
13	256	120	86	63
14	256	120	74	63
15	256	120	80	63
16	256	120	66	63
17	256	120	80	63

Table 2: MAS of the (GHG PSC + proposed SSC) to the GHG PSC is shown. Comparing
to table (1) we can see that the aperiodic auto correlation of the proposed SSC (figure 4)
with the GHG PSC is better than the current SSC (table 1).

3

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Cheju Korea, 1-4, June 1999   TSGR1#5(99)574

As for complexity, we can see that the proposed SSC will have slightly lower complexity because it will use only the correlation output $R_A(k)$ in figure (3) as against the current SSC which will need to multiplex with both the outputs $R_A(k)$ and $R_B(k)$. Further, the proposed SSC does not need to do any sign flips as the current SSC will have to, to remove the PSC mask from the SSC.

3.0 Conclusions and proposal

We have proposed a set of new SSC sequences corresponding to the GHG PSC for which the (GHG PSC + proposed SSC) to GHG PSC MAS is much lower. Although, this does not have any impact on the acquisition performance, codes with lower MAS should be preferred. Further, the proposed SSC slightly reduces the stage 2 acquisition complexity. The proposed SSC still employs a Walsh-Hadamard code on top, implying that a Hadamard transform can be used for the stage 2 of acquisition of the proposed SSC's.

References

[1] Siemens, Texas Instruments, "Generalised Hierarchical Golay Sequence for PSC with low complexity correlation using pruned efficient Golay correlators", Tdoc R1-99554, Cheju, Korea, June1-4, 1999.

4